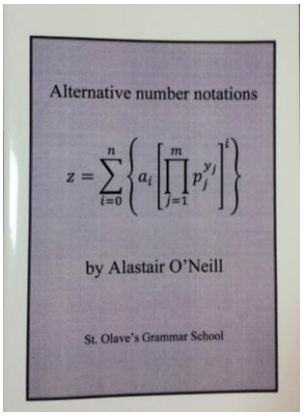
The Mathematics and Computing Faculty at St. Olave's Grammar School

Mathematics is the first and second most popular subject at A2 at St. Olave's, with massive numbers opting for both Mathematics and Further Mathematics in the Sixth Form and a real buzz of enthusiasm for the subject. Outstanding academic results are consistently amongst the best in this very high performing school. In fact, HMI described St. Olave's as: 'The best Further Mathematics school in the country!' Students are encouraged to produce scholarly works with a strong emphasis on STEM subject topics through the Extended and Higher Project Qualifications, and our own Academic Journal. Erudite examples that will inspire and engage the reader include an investigation into *Alternative Number Systems* and *To What Extent Does Infinity Exist?* Staff in the Faculty possess talent, skills, enthusiasm and imagination; their energy is rewarded by the satisfaction of working with some of the nation's best young mathematicians.



Enrichment and extension is a key feature of our provision. In addition to special STEP and MAT tuition, there has been regular success in national competitions with large numbers of Gold certificates in the Junior, Intermediate and Senior Mathematical Challenges, UKMT. A large number of students are normally invited to participate in the later rounds, with considerable success at a nationally significant level in the Olympiad competitions. St. Olave's is also a regional venue for the UKMT Team Challenge Competition, winning the Junior Competition in 2007 and regularly competing for the top prize in the national finals of the Junior and Senior competitions. A student team also runs the very successful Maths in Motion club.

Higher Education progression in Mathematics

The huge student interest in Mathematics and related subject areas translates into the highest aspirations for progression into most of the top universities, including Oxbridge, as shown below:

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Mathematics	8	9	14	13	18	13	8	11	12
Physics		4	7	3	1	6	8	8	9
Engineering	17	12	22	15	22	16	21	18	33
Computing	4	4	4	5	2	3	2	2	6
Economics	19	28	21	21	15	25	33	23	26
Total	**51**	**57**	**58**	**57**	**58**	**63**	**72**	**62**	**86**
Oxbridge in these areas	7	10	6	15	14	10	14	14	13

Computing operates within the Mathematics Faculty with a strong focus on higher order skills, particularly programming, through extended projects that enable our students to develop analytical and problem solving skills. An extremely popular option at GCSE, Computing is also offered at AS and A2 where recent results show St. Olave's as one of the highest ranking schools for adding value at KS5. The school recently won a substantial grant from the LSEF (London Schools Excellence Fund) and a major component of this project, called PLASMA-T, developed the programming skills of teachers at Primary and Secondary level across schools in South London. The timing of this exciting development coincided with a national push to equip a new generation of young people with good programming skills and to ensure that London has teachers who can deliver this with confidence.

Meet the staff:

James Davis	Head of Faculty	B.Sc., University of Wales, Cardiff
Polina Vasileva	Second in Faculty	B.Sc., University of Sussex
Michael Evans	Deputy Headmaster	B.Sc., University of Durham
Thomas Henley		B.Sc., M.Sc., C.Math., M.I.M.A., University College, Cork
Elizabeth Kite		B.Sc., University of Birmingham; B.A. The Open University
Dawn Lewis		B.Sc., University of Portsmouth
Scott Li		B.Sc., University of Warwick
Neil Maltman		M.A., Pembroke College, University of Cambridge
Tim McCurrach		M.Math., Magdalen College, University of Oxford
Joanna Munday		M.A., Christ's College, University of Cambridge
Aydın Önaç	Headmaster	B.Sc., University College, London; B.Mus., Royal College of Music
Bosede Onifade	HoD Computing	Ph.D., University of Central England
Ryan Palmer		M.Sc., UWI and Florida State University
Janine Penny		B.Sc., Royal Holloway, University of London
Ian Sanderson		B.Sc., University College Rhodesia, University of London
Sujatha Saul	Computing	M.Sc., Chenai and Trichy Universities

General organisation

In Years 7 and 8 pupils are taught Mathematics in form groups. They follow a standardised scheme of work beginning at around Level 5 of the National Curriculum, using resources designed for the most able students. By the end of Year 8, staff are able to accurately assess pupils' relative ability and hence Year 9 is divided into two parallel higher and two parallel lower classes. At the end of Year 9, most students have reached Level 8. At the beginning of Year 10, the four forms are rearranged into five teaching sets of two parallel top, one middle, and two parallel lower sets.

During KS4 all five sets are prepared for the Edexcel GCSE papers. The department is justly proud of its consistently excellent results at this level (100% A/A* in 2015, 98% in 2014; with the overwhelming majority of students securing the top grade). In 2015 the top two sets sat the Free Standing Unit in Additional Mathematics in June.

The Mathematics department has experienced significant expansion in recent years due to the popularity of the subject: Mathematics and Further Mathematics are now the first and second most popular subjects at A level. At present, there are 12 classes, with 187 out of the total 225 students in Year 13, studying at least A Level Mathematics. Similarly, there are 12 sets, with 207 out of the total 180 Year 12 students, taking at least AS Level Mathematics. The department follows the OCR specification at KS5. The AS Level sets are each taught by two staff, with one usually focusing predominantly on the pure units and the other on the applied units. At A2, approximately half of the cohort achieve Grade A*, with above 95% achieving a Grade A*-B. Very large numbers of students undertake the Further Mathematics course (currently 83 A2 and 37 AS in Year 13, and 128 in Year 12) with the key metrics being similar to those achieved in the standard A-Level. The school was recognised by the Good Schools' Guide in 2008 for producing the best Further Mathematics results in the country. Candidates are prepared for STEP and MAT papers in twice weekly twilight sessions, and each year a significant number of students leave St. Olave's to study Mathematics solely or as an integral part of their degree at university.

The Faculty is very well resourced and boasts a dedicated IT suite, interactive whiteboards in every room, five class sets of graphical calculators, tablet computers and a generous amount of specialist computer software. Staff are encouraged to use IT where appropriate and training is provided in the use of such materials.

St. Olave's Grammar School has been a Specialist Mathematics and Computing School and the department has benefited enormously from Specialist Status. Specialist status funding enabled the department to run an extensive programme of revision sessions for KS3, KS4 and KS5 which have been sustained at present; and facilitated the development of the department's impressive Virtual Learning Environment. Maths Clinics and the Maths Buddying programme provide additional support.

Wider activity

The Mathematics Faculty is widely known for its weekly STEP and MAT classes. Here students, including those from other schools, are challenged to the boundaries of their understanding as they prepare for the Cambridge Entrance examinations or for entrance to Oxford or other top Russell Group universities. The school enables a number of colleagues to be involved in the CMEP (Cambridge Mathematics Education Project).

Outreach

We have provided support for local Secondary schools through INSET on specialised software, including Autograph and Derive; developed GCSE revision guides and classes for Mathematics staff; delivered a series of seminars for The Prince's Teaching Institute, and invited parents and students from other schools to the Olavian Lecture Series. Our ICT training for Silver Surfers and Year 5 Computer Club have been very popular. Involvement with local Primary schools has helped Mathematics to flourish through an annual Year 5 Mathematics Day.

LSEF plans included a programme of INSET to develop excellence in teaching Mathematics, STEP and Olympiads. Links with schools in India, a programme of Lectures, a team of ambassadors and a series of high profile events supported students making Russell Group and Oxbridge applications. A programme of Extension/Master classes for Primary teachers and pupils helped to develop excellence and raise aspirations in areas of social disadvantage.

Chess

The associated Chess Club has thriving membership with players operating at National Championship level and specialist weekly coaching. The team has successfully retained the Kent Junior Chess Association's prize as a result of excellent performances at their highly competitive Grand Prix events; won the Bob Wade Memorial Tournament; and secured a top 3 place every year for the last decade at the Millfield International Competition, confirming our reputation as one of the best schools in the county. Old Olavian, Callum Kilpatrick has now achieved one of three Grandmaster norms as well as a FIDE Master title; Anantha Anilkumar finished top in the England Under 11 Team Squad Trials, and represented the country in the World Youth Chess Championships. Three of our players were members of the Kent squad which won the National Championship last year.

Visiting speakers

A range of eminent speakers, particularly those based in university Mathematics, Science and Economics Faculties, visit the school and speak to audiences of students and parents, including those from other schools. Recent visitors have included:

○ Matt Parker		Maths in action
○ Marcus Du Sautoy	*Oxford*	Prime numbers
○ Zubin Siganporia	*Oxford*	Elliptic curve cryptography
○ Dr Acheson	*Oxford*	1089 and all that
○ Dr Lobb	*Harvard*	The circle
○ Prof Berkshire	*Imperial*	Fermat's last rollercoaster
○ Prof Körner	*Cambridge*	How to hunt a submarine
○ Dr Waalkens	*Bristol*	Sectio Divina
○ Dr Cooley	*Cambridge*	The four-colour theorem
○ Dr Silvester	*Kings*, *London*	Primes and polygons
○ Luke Abraham	*Cambridge*	½! & other nonsensical expressions
○ Thomas Hudson	*Oxford*	The Banach-Tarski paradox
○ McClintock	*Cambridge*	The mathematics of really good shuffling
○ James Munro	*Cambridge*	Proof and transfinite cardinals
○ Niko Laaksonen	*UCL*	Prime number theory
○ Prof Budd	*Bath*	101 uses for quadratic equations

Olavian Lecture Series speakers (with a specific Science bias) have included:

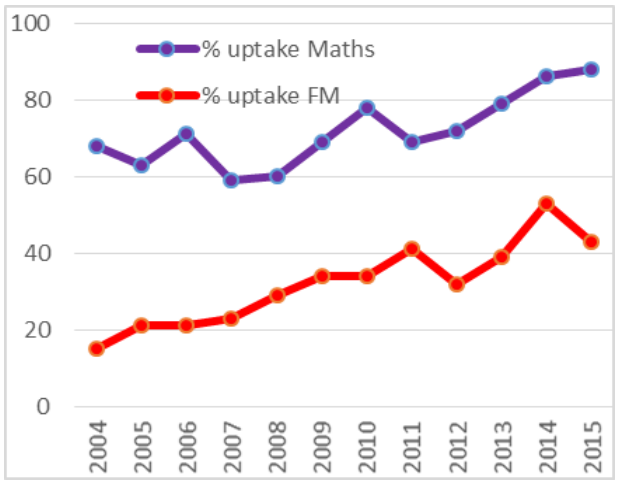
○ Lord Robert Winston	*Imperial*	Will we still be human in the 21st century?
○ Prof Robert Freedman	*Warwick*	How proteins work.
○ Prof Steve Jones	*UCL*	Genes: Nature, Nurture or Neither?
○ Dr Adam Rutherford		Chuck D: Evolution, synthetic biology and hip hop.
○ Sir Richard Friend	*Cambridge*	The next-generation of flexible screens and solar cells.
○ Dr Rob Mulvaney		Frozen time: Antarctic record of climate and atmosphere

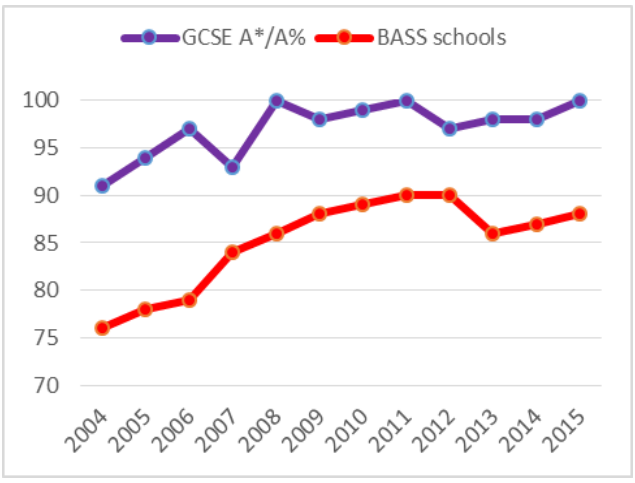
Visiting lecturers who have given Economics and Finance related talks:

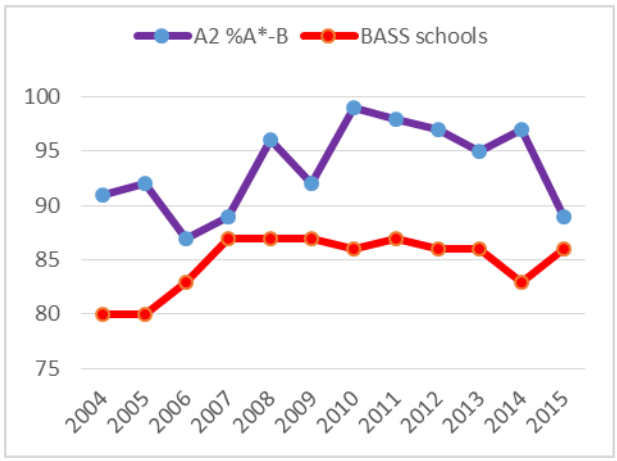
○ David Smith	*Oxford*	The Times Economics Editor
○ Evan David	*Oxford*	BBC Economics Editor
○ Martin Wolf	*Oxford*	Economics Editor FT
○ Paul Mason		Economics Editor Newsnight
○ Madison Pirie		Adam Smith Institute
○ Jonathan Glennie	*Cambridge*	IOD, Guardian Newspaper Economic Development
○ Dr Andrew Lilico		Europe Economics

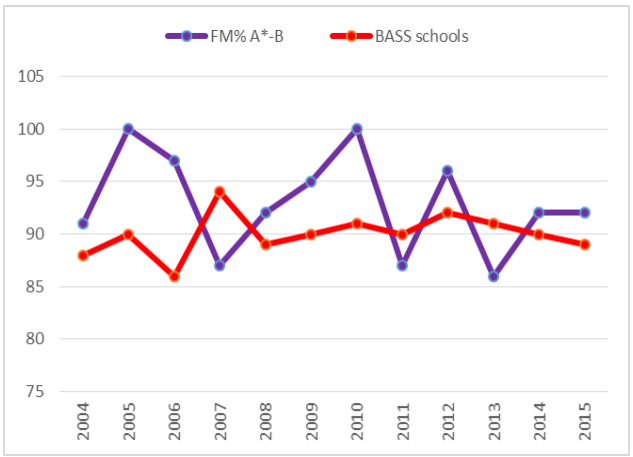
Appendix 1: Academic results and comparison with other BASS (Boys' Academically Selective Schools)

	GCSE: A*/A	BASS		AS: A/B			A2: A*/B	BASS		FM: A*/B	BASS		% uptake Maths	% uptake FM
2004	91	76		80			91	80		91	88		68	15
2005	94	78		90			92	80		100	90		63	21
2006	97	79		76			87	83		97	86		71	21
2007	93	84		86			89	87		87	94		59	23
2008	100	86		80			96	87		92	89		60	29
2009	98	88		89			92	87		95	90		69	34
2010	99	89		89			99	86		100	91		78	34
2011	100	90		86			98	87		87	90		69	41
2012	97	90		90			97	86		96	92		72	32
2013	98	86		90	75		95	86		86	91		79	39
2014	98	87		92	72		97	83		92	90		86	53
2015	100	99		92	73		89	86		92	89		88	43









Appendix 2: Junior Mathematical Challenge (Y7 & Y8)

Year	Entries	Gold Top 6%	Silver Next 14%	Bronze Next 21%	JMO
14-15	240	99	85	40	11
13-14	232	101	69	42	
12-13	226	74	74	50	10
11-12	230	72	78	45	9
10-11	238	102	66	40	6
09-10	235	75	86	40	9
08-09	232	82	65	49	6
07-08	236	90	66	55	9
06-07	231	84	78	47	13
05-06	236	89	71	47	11

Junior Mathematical Olympiad (Y7 & Y8)

Year	Entries	Medal, Top 200	Dist. Top 300
14-15	11	Gold 2, Silver 2	
13-14	13	Gold 1, Bronze 1	
12-13	10	Gold 1, Silver 1, Bronze 2	
11-12	9	Bronze : 3	
10-11	6	Silver 1, Bronze 1	1
09-10	9		1
08-09	6		
07-08	9		1
06-07	13	Gold: 1 (Top 10), Silver 2	
05-06	11	Bronze : 1	4

UKMT Team Mathematics Challenge (Y8-9)

Year	Regional	National
14-15	2nd out of 37	25th out of 96
13-14	2nd out of 36	
12-13	1st out of 36	8th out of 80
11-12	1st out of 30	10th out of 96
10-11	1st out of 28	24th out of 96
09-10	2nd out of 22	Did not qualify
08-09	1st out of 21	32nd out of 69
07-08	1st out of 20	3rd out of 60
06-07	2nd out of 32	**1st out of 60**
05-06	1st out of 19	30th out of 60

Intermediate Mathematical Challenge (Y9 to Y11)

Year	Entries	Gold	Silver	Bronze	IMOK	Kangaroo
14-15	287	92	89	63	11	71
13-14	293	77	100	68	13	44
12-13	295	70	92	73	15	27
11-12	282	92	88	68	12	37
10-11	291	109	96	57	15	49
09-10	290	85	77	62	12	39
08-09	285	105	81	51	24	44
07-08	282	109	96	42	18	49
06-07	249	96	93	46	15	56
05-06	246	100	79	41	14	51

International Invitational IMOK (Y9 to Y11)

Year	Entries	Prize (Top 50)	Medal (Top 100)	Dist. (Top 150)
14-15	11			4
13-14	13	1	1	1
12-13	15			1
11-12	12	1	2	1
10-11	15	1	2	
09-10	12	2	2	1
08-09	23	4	4	1
07-08	22	2	4	1
06-07	15	2	3	1
05-06	14	2		1

Senior Kangaroo

Year	Entries	Merit Top25%
15-16	**28**	**9**
14-15	**27**	**7**
13-14	**20**	**5**
12-13	**19**	**6**

European Kangaroo

Year	Entries	Merit Top 300
14-15	68	20
13-14	41	16
12-13	27	7
11-12	36	10
10-11	45	13
09-10	35	9
08-09	40	21
07-08	41	10
06-07	53	20
05-06	49	25

Senior Mathematical Challenge (Y11 to Y13)

Year	Entries	Gold	Silver	Bronze	BMO
14-15	498	54	129	210	4
13-14	398	57	124	137	12
12-13	353	37	116	128	6
11-12	356	43	122	116	7
10-11	368	26	78	107	9
09-10	350	52	77	102	12
08-09	351	26	83	93	14
07-08	352	39	78	91	11
06-07	283	32	76	68	6
05-06	278	30	87	69	10

British Mathematical Olympiad

Year	Entries	Round 2 qualifiers
12-13	7	2
11-12	10	2
10-11	14	2
09-10	14	1
08-09	14	2
07-08	7	2
06-07	8	2
05-06	7	1
04-05	4	2